Policy on Hydraulics

March 2001

Introduction

The Olympic Region Hydraulics Policy is developed to define the duties, responsibilities, expectations, and interactions between the design Project Engineer (PE), region Environmental & Hydraulic Services (EHS) Office, Project Development Office, Olympia Service Center (OSC) Hydraulics Section and the OSC Water Quality & Hazardous Materials Program. The policy supplements the WSDOT Hydraulics Manual (HM) and the Highway Runoff Manual (HRM) by defining the duties of each group listed above, and giving specific direction for the development of Hydraulic Reports, Temporary Erosion & Sediment Control (TESC) Plans, Stormwater Site Plans (SSP), and Spill Prevention, Control, and Countermeasures (SPCC) Plans.

Duties

Project Engineer

The Project Engineer is the project manager, and the emphasis of this policy is to facilitate the provision of service to the project engineer to enable him or her to deliver a quality project.

The development and accuracy of hydraulic documentation, as well as the approval of Hydraulic Summaries, is the responsibility of the design Project Engineer assigned to the project. When assistance is necessary to complete hydraulic documentation, the Project Engineer should request assistance from the region Environmental & Hydraulic Services Office. It is highly advisable for the Project Engineer to schedule an initial hydraulic consultation, with EHS office staff, during project definition. The purpose of this consultation is to review the hydraulic design, erosion control, and stormwater treatment needs of the project.

The Project Engineer should send a draft hydraulic report to the EHS Office (when required for a project) prior to beginning PS&E for the project. The development of the Stormwater Site Plan (SSP) and Temporary Erosion & Sediment Control (TESC) Plan can be done concurrently during the preparation of PS&E documentation. It is the responsibility of the Project Engineer to insure all calculations within the reports are verified and accurate. A final Hydraulic Report, TESC Plan and SSP (when required), should be submitted to the EHS Office in sufficient time to review and to obtain approval prior to the project beginning the ten-week count down to the advertisement date. It is the expectation that final approval of Hydraulic Reports,

TESC Plans and SSPs, will be received by the Project Engineer prior to a project going to Ad.

On occasion, a regulatory agency requires a Professional Engineer's stamp on hydraulic documentation for permitting purposes. If this is the case, WSDOT's normal stamping procedures will be in effect, as provided for in Executive Order E1010.00 (*Certification of Documents by Licensed Professionals*). After approval of the hydraulic document, the engineer under whose direction it was prepared (usually the Project Engineer), if satisfied with it's content, will stamp it. In the alternative, the hydraulic document may be stamped by a licensed hydraulic engineer in the EHS Office, as provided in E1010.00, at the discretion of the Project Engineer.

When there is not sufficient WSDOT staff to perform hydraulic design, and/or prepare SSPs or TESC Plans, these tasks may be done by outside consultants. WSDOT has on-call agreements with consulting firms for general environmental and design work. These consultants also can provide hydraulic engineering services, and it may be more timely and cost-effective to use an on-call agreement, especially when a consultant has already been retained by the EHS Office to perform environmental work. Accordingly, retention of these consultants for discrete hydraulic tasks should be coordinated with the EHS Office, who will act as consultant liaison if requested by the PE.

Region Environmental & Hydraulic Services Office

The EHS Office is responsible to provide technical assistance upon request, to review hydraulic reports, TESC Plans and SSPs, and to approve Type B Hydraulic Reports, TESC Plans, and SSPs. It will also be the responsibility of the EHS Office, upon receipt of hydraulic documentation, to forward all documentation to, and return all comments from, the appropriate OSC approval or review authorities.

These services are provided to the Project Engineer as an independent check to minimize errors in the development of the project's PS&E and facilitate the timely acquisition of environmental permits. The EHS Office will operate and maintain a status database on the progress of each project and report at the weekly status meeting, as appropriate.

Document and plan review will focus on current convention, conformance to policy, spot-checking of calculations, and consistency with the HM and HRM, and local regulations if applicable. Review of all calculations will only be done at the PE's request.

Draft reports and plans will be kept with a copy of comments only until a final copy is approved. Final copies of Hydraulic Reports, along with approval letters, will be filed in the Design Documentation File maintained by the project manager.

Project Development

It is the role of the region Project Development Office (i.e., Assistant Region Administrator for Project Development and Project Development Engineers) to provide direction to Project Engineers and the EHS Office in the implementation of this policy, to allow exceptions to it when appropriate, and to require revisions to the policy when necessary.

OSC Hydraulics Section

OSC is responsible for review and approval of Type A Hydraulics Reports. The duties of the Hydraulics Section are further defined in Section 1-2 of the Hydraulics Manual.

OSC Water Quality & Hazardous Materials Program

OSC Water Quality & Hazardous Materials Program is responsible for reviewing and offering comment on TESC and SPCC Plans, when requested by the region EHS Office; co-implementing the HRM with the OSC Hydraulics Section; and maintaining the stormwater outfall and BMP inventory and prioritization list. The WQ&HM Program also has responsibility for development and general implementation of stormwater NPDES permits that WSDOT is subject to.

Hydraulic Reports

Documented hydraulic analyses are an interdisciplinary extension of the design documentation required under Section 330 of the Design Manual. The content and type of hydraulic documentation required for various projects is defined in Sections 1-3 and 3-2.2 of the Hydraulics Manual. The use of hydraulic documentation has expanded and now has become an integral component of environmental documentation. Hydraulic documentation is used when applying for permit coverage as well as for legal defense and for the efficient preparation of Plans, Specifications & Estimates (PS&E).

To supplement and further define direction provided by the Hydraulics Manual, the designer should consider the following criteria when determining which type of report to prepare, or contact the EHS Office.

Type A

The Hydraulics Manual states that Type A reports should be prepared for projects that include culverts greater than 48 inches in diameter, detention, and/or closed storm sewer systems. The Olympic Region refines the Type A report requirement such that, in addition to culverts greater than 48 inches, the following project components require preparation of a Type A report:

- Detention facilities with a capacity equal to or greater than 1 acre-foot

- Over 100,000 square feet of new impervious area
- Storm sewer systems with more than 10 hydraulic structures in a single run
- Channel realignments
- Bridge replacement projects (typically prepared by OSC Hydraulics)
- Any fills in floodways
- Fills that include an excess of 1,000 cubic yards of displacement in the floodway fringe.

Type B

Projects with the following components require preparation of a Type B report:

- Detention facilities with less than 1 acre-foot in capacity
- Between 5,000 and 100,000 square feet in new impervious area
- Storm sewer systems with 10 or less hydraulic structures in a single run
- Culverts equal to or greater than 36 inches in diameter, but less than or equal to 48 inches in diameter.

Hydraulic Summary

A Hydraulic Summary should be prepared for projects with:

- Minor changes to the existing drainage systems
- Replacement, removal or relocation; or adjustment (other than minor elevation adjustment) of catch basins
- Culverts less than 36" diameter
- Installation of approach culverts
- Removal or installation of curbing
- Overlays that reduce curb relief
- Roadway crown correction

Stormwater Treatment

Proposed projects shall not degrade the level of existing stormwater treatment. Existing stormwater treatment may be provided by an engineered stormwater BMP, or by natural ponds, swales, vegetation, or wetlands that provide similar functions.

Water Quantity Treatment

Projects that add more than 2,000 square feet, but less than 5,000 square feet of new impervious surface, or include over 7,000 square feet of land disturbing activities, must address on-site water quantity treatment to the fullest extent practicable. This requirement does not include flow rate targets, but does require a reasonable effort to infiltrate, or reduce discharge flow rates from the project site.

All projects that add 5,000 square feet or more of new impervious surface must address water quantity flow control treatment for all drainage basins where new impervious area is added. This includes release rate targets of 50% of the existing 2-year storm, and no more than 100% of the existing 10-year and 100-year storms.

Water Quality Treatment

It is WSDOT's policy to provide water quality treatment for all projects, and WSDOT's long-term goal is to eventually retrofit all existing pavement to provide water quality treatment. However, it is generally accepted by resource agencies that this goal is cost prohibitive. Therefore, projects that are preservation only are exempt from meeting this goal. In addition to projects in the preservation program, projects that are low impact and do not add new impervious surface, i.e. signals, signing, and guardrail installation are also exempt.

All projects that include new construction will provide water quality treatment, regardless of the amount of impervious area added or reduced. At a minimum, water quality treatment will be provided for all new impervious surfaces. All existing impervious surfaces will also be retrofitted to provide water quality treatment, where such treatment is practicable. In determining feasibility for retrofitting existing pavement, the following factors should be considered:

- Whether the cost of retrofitting is reasonable*;
- Whether additional stormwater treatment can physically be accomplished within the project limits; and
- Whether additional right-of-way, if needed, is available and capable of being acquired.

** Reasonable cost criteria to be developed. In the interim, a benefit/cost ratio of 1:1 for stormwater treatment is to be assumed.*

If meeting minimum stormwater treatment requirements is not practicable on the project site, an exception to the minimum requirements can be made, but off-site mitigation is required. First, an explanation must be written to document the reason for the exception. Second, alternative off-site mitigation must be proposed. Typically, it is preferred to provide in-kind mitigation, somewhere in the same drainage basin. The EHS Office will coordinate proposals for off-site mitigation through OSC Environmental Affairs Office, Washington Department of Ecology, and if necessary, Washington Department of Fish and Wildlife.

Temporary Erosion & Sediment Control (TESC) Plans

TESC plans, as defined in Section 5-2.2 of the HRM, will be developed for all projects that require grading, ditching, filling, embankment compaction or excavation. Exceptions for minimal amounts of excavation, such as for a sign or signal foundation, or guardrail flare terminal, are acceptable.

Stormwater Site Plans (SSP)

Stormwater Site Plan requirements are defined in Chapters 2 and 5 of the HRM.

Miscellaneous Items

Sensitive Ground Water Aquifer Areas

These areas include Sole Source Aquifers designated by the U.S. Environmental Protection Agency, Wellhead Protection Areas designated by the Washington State Department of Health, and critical aquifer recharge areas designated by local jurisdictions.

The EHS Office maintains maps of these areas, and EHS Office staff normally determines possible location of a proposed project in such an area during project definition.

If a project is located in one of these areas, difficult site conditions may be present which make the use of conventional stormwater treatment facilities incompatible. In such cases, design criteria may have to be modified, or experimental facilities utilized. In both instances, the EHS Office should be consulted early in the design process to allow for adequate review and approval of alternate measures to achieve stormwater treatment.

Hardness of Existing Shoulders

On some roadways, unpaved shoulders are of such hardness to be considered impervious, as a practical matter. In such cases, when a project proposes to pave the shoulders, widen the traffic lanes, or add lanes; and the design project office desires to have the shoulders considered impervious for the purpose of determining the amount of new impervious surface, a site visit with EHS Office staff should be scheduled early to reach a mutual agreement on this determination.

Inlet Spacing for Storm Sewer Systems

Inlet spacing shall be limited to a maximum of 200 lineal feet at the request of Maintenance staff. This is because pipe runs that are longer than 200 linear feet are difficult, and in some locations impossible, to clean and maintain.

Grate Inlets

Grate inlets located in the roadway shoulder shall be a precast Grate Inlet Type 2 made of reinforced concrete. Grate inlets were traditionally used to drain grass medians and roadside ditches in areas that were away from live traffic loads. Now grate inlets are being selected for use on paved shoulders because the lid opening is much larger than a catch basin and less likely to plug with debris. However, live traffic loads can damage a non-reinforced Grate Inlet Type 1. Therefore, a Grate Inlet Type 2 should be specified for these applications. In addition, grate inlets shall

not be placed in areas subject to bicycle traffic or continuous automobile traffic loadings.

Quarry Spalls around Grate Inlet Lids

Quarry spalls shall not be placed around grate inlets. Quarry spalls have at times been placed around the lids of grate inlets as an erosion control measure. This creates a safety hazard for the maintenance personnel who need good footing around the inlets to lift the heavy lids. Back and ankle sprains have resulted from workers attempting to lift these lids while standing on loose quarry spalls. If quarry spalls check dams are desired for erosion control, locate them about 10 feet away from the grate inlet.

Construction Oversight

Because streams are dynamic systems, it is difficult to design certain in-stream structures, such as river barbs, and predict how the stream will respond. For projects that include such structures, approximate locations and quantities will be estimated and a force account item included in the contract. This will allow adjustments to the structures during construction. In certain instances, where on-site design is necessary or desirable, it may be essential for a hydraulic engineer to be present during structure installation. In such cases, the PE should notify the hydraulic engineer three days prior to the start of work.

APPROVED:

Randall A. Hain Date
Assistant Region Administrator for Project Development

March 2001